

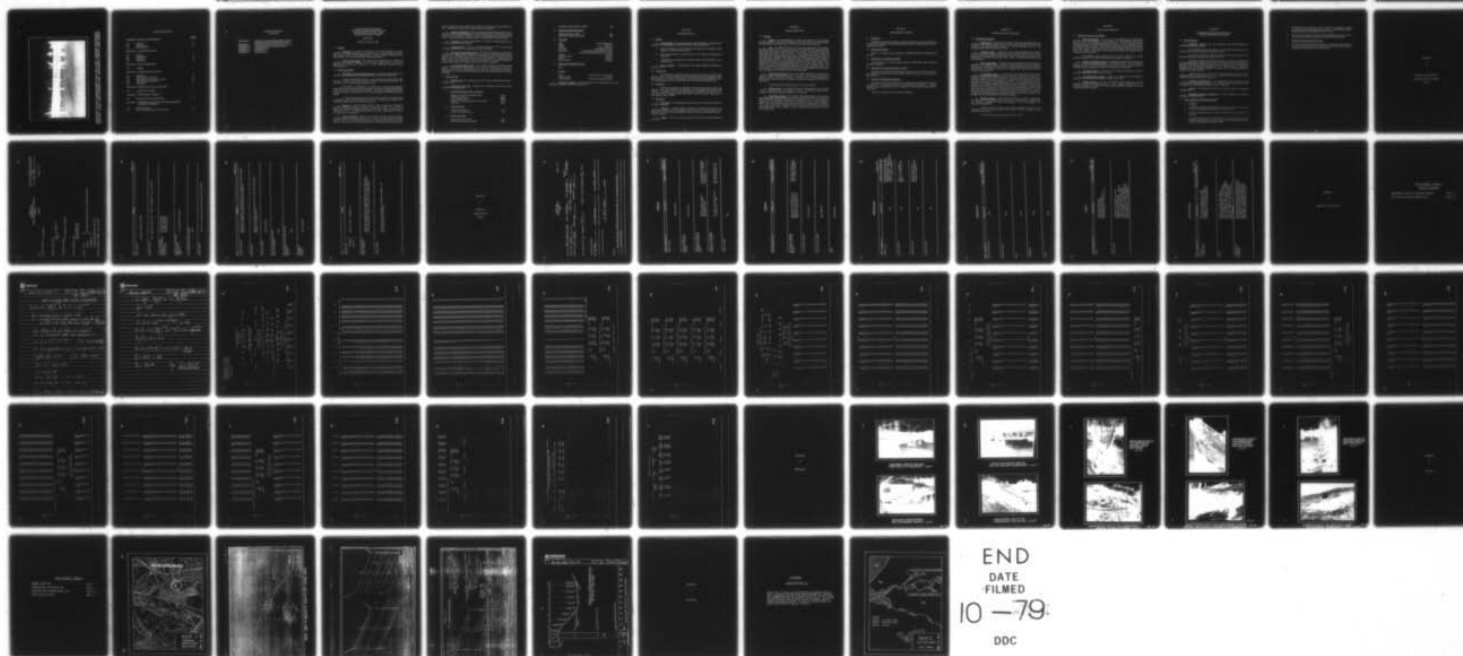
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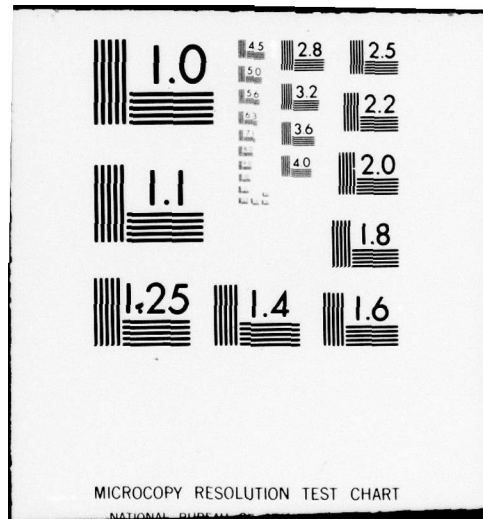
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NATIONAL DAM SAFETY PROGRAM. COUNTRY LAKES DAM NUMBER 1 (NJ-000--ETC(U)
JUN 79 J J WILLIAMS DACW61-78-C-0052

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DELAWARE RIVER BASIN
POLE BRIDGE BRANCH.
BURLINGTON COUNTY
NEW JERSEY

LEVEL

COUNTRY LAKES DAM

NO. 1

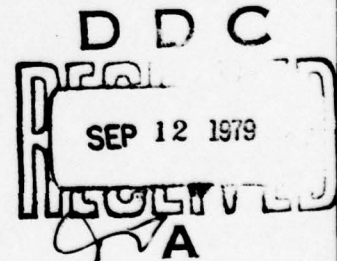
NJ 00050

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



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DEPARTMENT OF THE ARMY

Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

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June, 1979

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
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11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer District, Philadelphia Custom House, 2d & Chestnut Streets Philadelphia, Pennsylvania 19106		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 12476P
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18. SUPPLEMENTARY NOTES Copies are obtainable from National Technical Information Service, Springfield, Virginia, 22151.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dams Visual Inspection Spillways Structural Analysis County Lakes Dam #1, N.J. National Dam Safety Act Report Safety		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report cites results of a technical investigation as to the dam's ade- quacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report. 410 760 J013		



DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE-2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO
NAPEN-D

29 AUG 1979

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, NJ 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Country Lakes No. 1 Dam in Burlington County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Country Lakes Dam No. 1, initially listed as a high hazard potential structure but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in fair overall condition. The spillway is considered inadequate since 59% of the Spillway Design Flood -SDF- would overtop the dam. (The SDF, in this instance, is one-half the Probable Maximum Flood.) To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The adequacy of the spillway should be determined by a qualified professional consultant, engaged by the owner, using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980.

b. Within six months of the date of approval of this report the following remedial actions should be completed:

(1) A service bridge should be provided to facilitate the removal of stop logs.

NAPEN-D

Honorable Brendan T. Byrne

(2) In several areas erosion of the embankment is taking place behind the upstream and downstream retaining walls. These areas should be backfilled and compacted with suitable material.

(3) Areas below design elevation should be filled and compacted to restore the embankment to design elevations and slopes. The embankment slopes should be protected with vegetative cover or riprap.

(4) Trees and brush should be removed from the embankment and the areas where trees have been removed should be backfilled and regraded.

(5) The owner should develop and implement a maintenance and inspection checklist to insure that the stop logs and all other items associated with the structure are maintained on a regular basis.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Edwin B. Forsythe of the Sixth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

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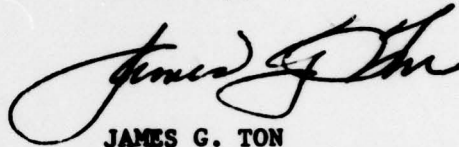
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NAPEN-D

Honorable Brendan T. Byrne

An important aspect of the Dam Safety Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,



JAMES G. TON
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Copies furnished:
Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

John O'Dowd, Acting Chief
Bureau of Flood Plain Management
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

COUNTRY LAKES DAM NO. 1 (NJ00050)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 12 April 1979 by O'Brien & Gere Engineers, Inc., under contract to the U.S. Army Engineer District, Philadelphia, in accordance with the National Dam Inspection Act, Public law 92-367.

Country Lakes Dam No. 1, initially listed as a high hazard potential structure but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in fair overall condition. The spillway is considered inadequate since 59% of the Spillway Design Flood -SDF- would overtop the dam. (The SDF, in this instance, is one-half the Probable Maximum Flood.) To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The adequacy of the spillway should be determined by a qualified professional consultant, engaged by the owner, using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980.

b. Within six months of the date of approval of this report the following remedial actions should be completed:

(1) A service bridge should be provided to facilitate the removal of stop logs.

(2) In several areas erosion of the embankment is taking place behind the upstream and downstream retaining walls. These areas should be backfilled and compacted with suitable material.

(3) Areas below design elevation should be filled and compacted to restore the embankment to design elevations and slopes. The embankment slopes should be protected with vegetative cover or riprap.

(4) Trees and brush should be removed from the embankment and the areas where trees have been removed should be backfilled and regraded.

(5) The owner should develop and implement a maintenance and inspection checklist to insure that the stop logs and all other items associated with the structure are maintained on a regular basis.

APPROVED: 

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

DATE: 27 August 1979

DELAWARE RIVER BASIN

**Name of Dam: Country Lakes Number 1 Dam
County & State: Burlington County, New Jersey
Inventory Number: NJ 00050**

**PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM**

Prepared by:

**O'BRIEN & GERE ENGINEERS, INC
JUSTIN & COURTNEY DIVISION**

For

**DEPARTMENT OF THE ARMY
Philadelphia District, Corps of Engineers
Custom House-2nd & Chestnut Streets
Philadelphia, PA 19106**

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM INVENTORY PROGRAM

Name of Dam: Country Lakes Number 1 Dam ID #NJ00050
State Located: New Jersey
County Located: Burlington
Stream: Pole Bridge Branch
Coordinates: Latitude 39° 56.9', Longitude 74° 32.5'
Date of Inspection: April 12, 1979

ASSESSMENT

Based on the visual observations made during the field investigation, information made available by New Jersey DEP and conversations with the Owner's representative, Country Lakes Number 1 Dam (owned by Friendship Lakes, Inc.) is considered to be in overall fair condition.

The dam is an earth embankment approximately 580 feet long with a maximum height of about 13 feet. A 28-foot wide paved road is constructed along the crest of the dam. The spillway is constructed of concrete piers with stop logs spanning horizontally between vertical grooves in adjacent piers. It is located approximately 10 feet upstream of the bridge for the road along the top of the dam. The 64.0 acre normal pool is used for recreation by members of the Country Lakes development.

The dam is considered to be in the "Significant" hazard category.

Examination of the results of the hydrologic and hydraulic analyses indicate that the spillway is capable of passing 58 percent Spillway Design Flood (SDF) without overtopping the earth embankment. The SDF chosen for use on this site is 50 percent of the Probable Maximum Flood (PMF). The spillway is classified as "Inadequate" but not "Seriously Inadequate" because the dam is an "Intermediate" size, "Significant" hazard Structure.

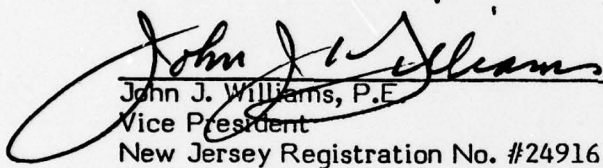
Several deficiencies noted require remedial measures or maintenance soon.

a. Facilities.

1. A detailed hydrologic and hydraulic study should be made and the need and type of mitigating measures should be determined.
2. A service bridge should be provided to facilitate the removal of stop logs.
3. In several areas erosion of the embankment is taking place behind the upstream and downstream retaining walls. These areas should be back-filled and compacted with suitable material.

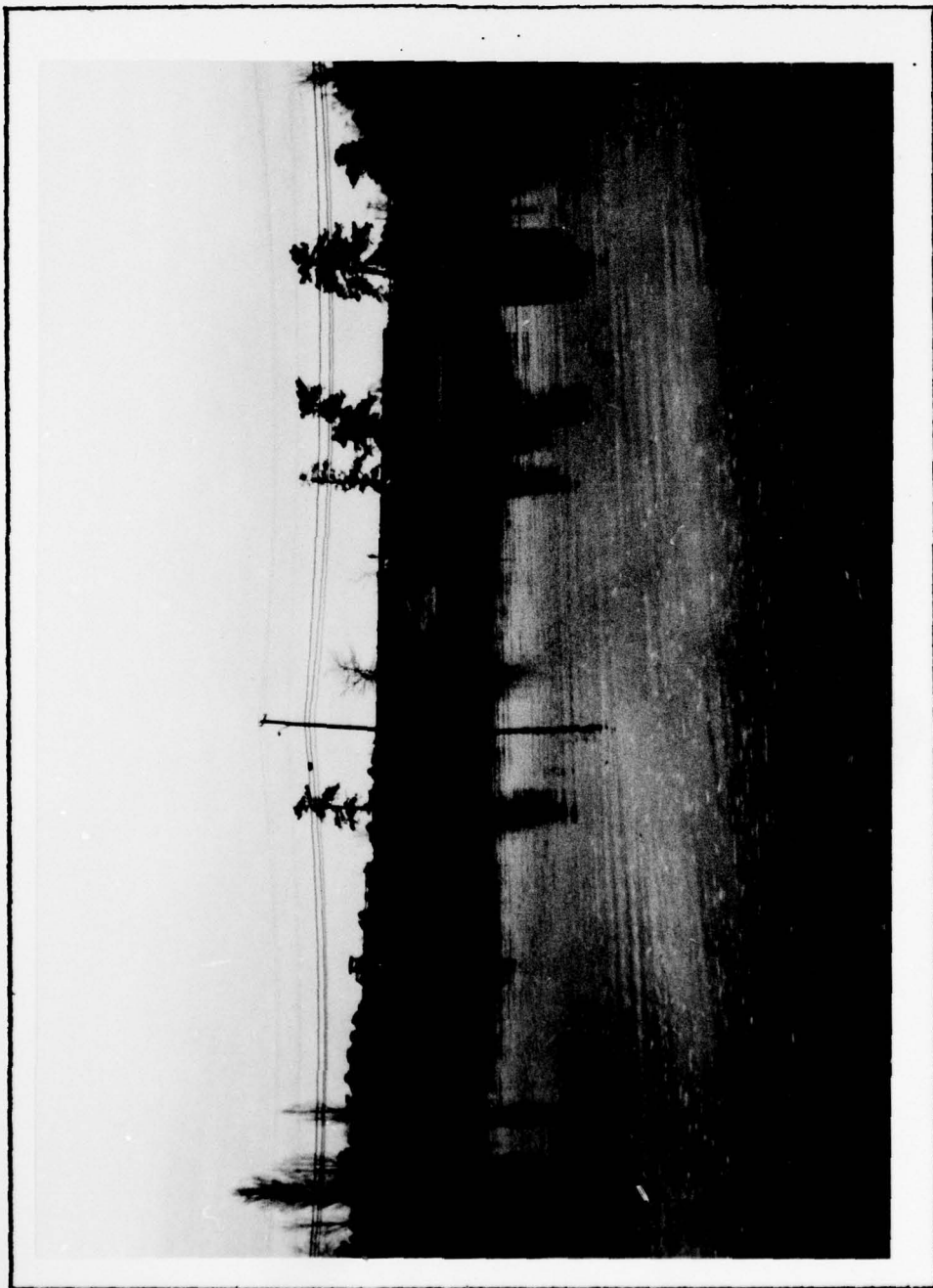
4. Areas below design elevations should be filled and compacted to restore the embankment to design elevations and slopes. The embankment slopes should be protected with vegetative cover or riprap.
5. Trees and brush should be removed from the embankment and the areas where trees have been removed should be backfilled and regraded.
- b. Operation and Maintenance Procedures
 1. The Owner should develop and implement a maintenance and inspection checklist to insure that the stop logs and all other items associated with the structure are maintained on a regular basis.

O'BRIEN & GERE ENGINEERS, INC.
JUSTIN & COURTNEY DIVISION


John J. Williams, P.E.
Vice President
New Jersey Registration No. #24916

Date: 1 August 1979





*OVERVIEW OF THE EMBANKMENT AND SPILLWAY LOOKING UPSTREAM
COUNTRY LAKES DAM NUMBER ONE, BURLINGTON COUNTY, NEW JERSEY*

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APPENDIX F -	SITE GEOLOGY

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
COUNTRY LAKES NUMBER 1 DAM
INVENTORY NUMBER - NJ00050

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority. This report is authorized by the Dam Inspection Act, Public Law 92-367, and has been prepared in accordance with contract #DACW 61-78-C-0052 between O'Brien & Gere Engineers, Inc., Justin & Courtney Division and the United States Army Corps of Engineers, Philadelphia District.

b. Purpose of Inspection. The purpose of this inspection is to evaluate the structural and hydraulic condition of the Country Lakes Number 1 Dam and appurtenant structures and to determine if the dam constitutes a hazard to human life or property.

1.2 Project Description

a. Description of Dam and Appurtenances. (From information obtained from the New Jersey Department of Environmental Protection (DEP), Trenton, NJ)

Country Lakes Number 1 Dam is an earth embankment approximately 580 feet long. A 28 foot wide paved roadway is located on the crest of the dam. The embankment has a maximum height of about 13 feet.

The spillway is constructed of concrete piers with stop logs spanning horizontally between vertical grooves in adjacent piers, and is located approximately 10 feet upstream of the bridge for the roadway. The spillway discharges through the two-span concrete bridge which has a total opening length of 50 feet and 7.5-foot height.

The concrete bridge abutments are connected upstream and downstream to masonry retaining walls that have been built to protect the upstream and downstream slopes of the embankment from erosion.

b. Location. Country Lakes Number 1 Dam is located in Pemberton Township, Burlington County, New Jersey, on Pole Bridge Branch. The dam site is shown on the USGS Quadrangle entitled "Brown Mills, New Jersey", at coordinates N 39° 56.9', W 74° 32.5'. A regional location plan of Country Lakes Number 1 Dam is enclosed as Plate 1, Appendix E.

c. Size Classification. Country Lakes Number 1 Dam has a maximum height of approximately 13 feet which places it in the "Small" size dam category for height because it is less than 40 feet high. The dam has a maximum storage volume of 1,176 acre-feet which places it in the "Intermediate" size dam category for storage because

it has a maximum storage greater than 1,000 acre-feet and less than 50,000 acre-feet. Therefore, the dam is in the "Intermediate" size category.

d. Hazard Classification. There are approximately 24 homes downstream of the dam which would possibly experience damage from water 1 to 2 feet deep in their first floors with a failure of the dam. There is little chance there would be any loss of life. Therefore, the dam should be placed in the "Significant" hazard category.

e. Ownership. Country Lakes Number 1 is owned by Friendship Lakes, Inc., P.O. Box #18, Brown Mills, NJ 08015.

f. Purpose of Dam. The dam was constructed as part of the Country Lakes real estate development. The reservoir is used for recreation.

g. Design and Construction History. The dam was originally constructed in 1953 without a legal permit. However, on September 13, 1955, based on drawings made by John G. Reutter from a survey of the existing structure, a legal permit was issued by the State Water Policy Commission of New Jersey. A drawing entitled "Plan of Spillway Constructed at Country Lakes situated in Township of Pemberton, County of Burlington, New Jersey" is enclosed as Plate 2, Appendix E.

h. Normal Operating Procedure. The reservoir is normally maintained at the spillway crest elevation. Inflow which occurs when the reservoir level is above the spillway crest elevation is discharged over the spillway. According to the Owner's representative, Mr. Steven Albano, the stop logs are removed during periods of heavy discharge.

1.3 Pertinent Data

a. Drainage Area. The drainage area to the Country Lakes Number 1 Dam is 16 square miles.

b. Discharge at Dam Site. No high pool or discharge records were made available for this inspection.

c. Elevation (feet above MSL - estimated).

Spillway crest (at the inspection time)	78.70
Design Top of Dam	86.00
Low Spot (top of dam)	82.30
Spillway slab invert downstream of stop logs	75.40
Tailwater	+72.0

d. Reservoir (miles)

Length of Normal Pool	0.95
Length of Pool (top of dam)	1.9

e. Storage (acre-feet)

Normal Pool (Elev. 78.70)	78.0
Design Top of Dam (Elev. 86.00)	1,176

Low Spot Top of Dam (Elev. 82.30) 548

f. Reservoir Surface Area (acres)

Normal Pool (Elev. 78.70) 64.0
Design Top of Dam (Elev. 86.00) 460

g. Dam Data

Type	Earth Embankment
Length	580 feet+
Height	13 feet (maximum)
Top Width	Approximately 28 feet
Side Slopes	Both upstream and downstream slopes vary from approximately 1H:1V to 3H:1V
Zoning	Unknown
Impervious Core	Unknown
Cutoff	Unknown
Grout Curtain	Unknown

h. Diversion and Regulating Tunnel

None

i. Spillway

Type	Concrete piers with stop logs
Length of Weir	50 feet
Crest Elevation	78.70 (at the inspection time)

j. Regulating Facilities. The stop logs are removed during periods of heavy discharge or in order to lower the reservoir level.

SECTION 2

ENGINEERING DATA

2.1 Design

a. Data Available. The engineering data made available by the New Jersey Department of Environmental Protection (DEP) includes the following.

1. Plan and sections of the original dam prepared by J.G. Reutter, dated January 19, 1955 and April 12, 1955.
2. Plans and sections for reconstruction of the bridge and embankment, dated 1974.
3. Miscellaneous correspondence, inspection reports, etc., between the state and the Owner.

b. Design Features. A description of the design features is discussed in Section 1.2.a.

2.2 Construction

No information is available concerning the construction of Country Lakes Number 1 Dam. However, based on the field investigation, the dam appears to have been constructed in general conformance with the reconstruction drawings of 1974. The spillway appears to be in conformance with the "As-built" drawings of 1955.

2.3 Operation

Operation procedures are limited to removing stop logs to reduce the reservoir water surface elevation during periods of heavy rainfall or to draw down the reservoir. According to the Owner's representative, residents in the vicinity of the dam are personally contacted by the Dam Tender when the reservoir water level is rising during a heavy rainfall.

2.4 Evaluation

a. Availability. The engineering data utilized in this report is provided by the New Jersey DEP.

b. Adequacy. Although design information is minimal and there is no construction information, the conditions observed during the field inspection and discussions with the Owner's representative appear to provide an adequate basis for a Phase I evaluation.

c. Validity. There is no reason to question the validity of the data obtained from DEP.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General. The field inspection of Country Lakes Number 1 Dam took place on April 12, 1979. At the time of inspection, the water surface was approximately two inches above the spillway crest. No underwater areas were inspected.

b. Dam. The upstream face of the dam has a sparse cover of vegetation. Beyond the extent of the retaining wall along the upstream face, inadequate slope protection is provided by some pieces of broken concrete. The upstream slope of the dam varies from about 3H:1V to 1H:1V. Erosion along the upstream slope has undermined the retaining wall in several areas. A 28-foot wide road is located on the top of the dam. Along the crest of the dam, depressions of the road are evident in the longitudinal direction. The visible portion of the downstream slope consists of sandy material and most of it has virtually no slope protection. Several deep erosion channels are evident on the downstream slope due to the surface runoff. Some erosion has also occurred behind the retaining wall of the downstream slope. The downstream slope of the embankment adjacent to the bridge is approximately 1H:1V. The remainder of the downstream slope varies from approximately 3H:1V near the toe of the slope to 1H:1V near the top of the embankment.

c. Appurtenant Structures. The water surface elevation of the reservoir is varied by means of the stop logs which are removed by hand during periods of heavy rainfall or when the reservoir is drained. According to the Owner's representative, Steven Albano, about four days are required to drain the reservoir from the normal pool level.

The spillway and the bridge appear to be in good condition.

d. Reservoir Area. The reservoir slopes are relatively flat varying between 2 and 10 percent with limited vegetative cover. No significant slope stability problems are apparent along the periphery of the reservoir.

e. Downstream Channel. The spillway discharges through a twin-span concrete bridge into a reservoir formed by a dam (Country Lakes Number 2 Dam) located about 2,800 feet downstream of Country Lakes Number 1 Dam. The slopes along the periphery of the downstream reservoir are relatively flat with limited vegetative cover. There are twenty four homes within the area that would possibly be flooded in the event of a dam failure. Therefore, failure of Country Lakes Number 1 Dam could cause appreciable property damage. However, there is little likelihood there would be any loss of life.

SECTION 4

OPERATIONAL FEATURES

4.1 Procedures

Operational procedures have been covered in Section 1.2.h. According to the Owner's representative, no formal operating procedures are established for Country Lakes Number 1 Dam.

4.2 Maintenance of Dam

There is no evidence that maintenance procedures have been established for this dam.

4.3 Maintenance of Operating Facilities

The maintenance of the stop logs consists of keeping them free of floating debris and sediment.

4.4 Description of any Warning System in Effect

According to the Owner's representative, residents in the vicinity of the dam are contacted personally by the Dam Tender when the reservoir is rising during a heavy rainfall.

4.5 Evaluation of Operational Adequacy

The spillway and stop logs appeared to be adequately maintained at the time of the inspection. The stop logs were not removed during the inspection. It appears however, that considerable time may be required for the removal process when the need arises.

The dam is accessible under all weather conditions.

SECTION 5

HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. Country Lakes Number 1 Dam has a drainage area of 16 square miles and impounds a reservoir of 78 acre-feet at the spillway crest elevation of 78.70. The spillway facility consists of a 50-foot long stop log weir. The available depth in the weir section is 7.5 feet.

b. Experience Data. According to the Owner's representative, Steven Albano, no records of reservoir level or rainfall are kept for this dam. Also according to the Owner's representative, it takes about 4 days to draw the reservoir down. The flashboards are pulled during periods of heavy runoff. The dam is monitored during heavy rainfalls.

c. Visual Observations. The bridge and the concrete portion of the spillway appeared to be in good condition. However, if a large flood occurs, the full spillway capacity may be difficult to attain due to the laborious process involved in removing the stop logs. This operation would also be impeded due to the lack of a service bridge over spillway piers.

d. Overtopping Potential. The Spillway Design Flood (SDF) for this "Intermediate" size, significant hazard structure is given as a range from one-half of the Probable Maximum Flood (PMF) to the PMF. The SDF selected for use is 0.5 PMF. The SDF hydrograph was routed through the reservoir with the starting water surface elevation at the crest of the spillway, Elev. 78.70. The maximum water surface elevation in the reservoir resulting from the SDF routing would be 4.4 feet above the spillway crest elevation of 78.70, and 0.8 feet above the low point of the top of the dam, Elev. 82.3. The low point of the dam crest was determined by a survey of the dam crest profile during the field investigation (See Sheet 5, Appendix E). The SDF routing has a peak inflow of 2175 cfs and a peak outflow of 2155 cfs. The spillway is capable of discharging 58 percent of the SDF without overtopping of the dam. Refer to Appendix C for computations and computer printouts.

e. Spillway Adequacy. Even though the spillway is capable of discharging only 58 percent of the SDF (0.5 PMF), the spillway is considered as "Inadequate" but not "Seriously Inadequate" because the structure is an "Intermediate" size, "Significant" hazard dam.

Failure of the dam would cause flooding in approximately 24 homes downstream of the dam on the shores of Country Lakes Number 2 to depths of 1 to 2 feet in their first floors.

There is little chance there would be any loss of life.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. On the date of the inspection, the embankment appeared to be in fair condition. The depression of the road adjacent to the bridge may be due to poor compaction during construction. Both the upstream and the downstream slopes do not have adequate slope protection. The downstream slope has no protection and is subject to an intensive erosive process from surface runoff. There are a number of areas where surface runoff has deeply eroded the downstream slope. The variation of the slopes of the embankment appears to be largely a result of erosion by surface runoff.

The spillway system, including the weir, floor slab, and the bridge abutments appear to be in good condition and show no signs of instability.

b. Design and Construction Data. The spillway appears to be in conformance with the "As-Built" drawings prepared by J.G. Reutter in 1955. There are limited drawings available for the earth embankment portion of the dam. No information on stability analysis, seepage computations, or soil properties is available.

c. Operating Records. According to the Owner's representative, there are no official operating records kept for this dam.

d. Post-Construction Changes. There is no record of any modifications made after the bridge and embankment reconstruction in 1974.

e. Seismic Stability. The dam is located in Seismic Risk Zone 1 of the Seismic Zone Map of Contiguous States. A dam located in Seismic Zone 1 is generally considered to be safe under any expected earthquake loading, if it is safe under static loading condition.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Evaluation. Based on the visual inspection the earth embankment is considered to be in fair condition.

The depressions of the road adjacent to the bridge along the top of the dam may be due to poor compaction during construction.

The erosion channels and depressions along the downstream face of the embankment appear to be the result of surface runoff.

As stated in Section 5.1.d, the SDF selected is 50 percent of the PMF for this "Intermediate" size, "Significant" hazard dam. Examination of the results of the hydrologic and hydraulic analyses indicate that the spillway is capable of passing 58 percent of the SDF without overtopping the dam. The spillway is classified as "Inadequate but not "Seriously Inadequate" because the dam is an "Intermediate" size "Significant" hazard structure.

Failure of the dam would affect approximately 24 homes with the possibility of causing damage from water 1 to 2 feet deep in their first floors. There is little chance there would be any loss of life.

b. Adequacy of Information. The information made available by DEP, conversation with the Owner's representative and observations made during the field investigation provided adequate data for a Phase I evaluation.

c. Urgency. The remedial measures recommended in section 7.2 should be initiated soon.

d. Necessity for Further Investigation. Further hydrologic and hydraulic investigations should be made.

7.2 Recommendations and Remedial Measures

a. Facilities .

1. A detailed hydrologic and hydraulic study should be made and the need and type of mitigating measures should be determined.
2. A service bridge should be provided to facilitate to the removal of the stop logs.
3. In several areas erosion of the embankment is taking place behind the upstream and downstream retaining walls. These areas should be back-filled and compacted with suitable material.

4. Areas below design elevations should be filled and compacted to restore the embankment to design elevations and slopes. The embankment slopes should be protected with vegetative cover or riprap.
5. Trees and brush should be removed from the embankment and the areas where trees have been removed should be backfilled and regraded.
- b. Operation and Maintenance Procedures
 1. The Owner should develop and implement a maintenance and inspection checklist to insure that the stop logs and all other items associated with the structure are maintained on a regular basis.

APPENDIX

A

Check List Engineering Data
Design, Construction, Operation
Phase I

NAME OF DAM Country Lakes #1 Dam
ID # N.J. 0050

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

Sheet 1 of 4

REMARKS

ITEM

AS-BUILT DRAWINGS Not available

REGIONAL VICINITY MAP

Refer to Appendix E,
Plate I

CONSTRUCTION HISTORY

No information available

TYPICAL SECTIONS OF DAM

Not available for
existing structure

OUTLETS - PLAN

DETAILS

CONSTRAINTS

No information available for existing structure

DISCHARGE RATINGS None available

RAINFALL/RESERVOIR RECORDS None available

ITEM

REMARKS

DESIGN REPORTS

No design reports available

GEOLOGY REPORTS

None provided in DEP files. Refer to Appendix F of this report.

DESIGN COMPUTATIONS

HYDROLOGY & HYDRAULICS

DAM STABILITY

SEEPAGE STUDIES

No data available
No data available
No data available
No data available

MATERIALS INVESTIGATIONS

BORING RECORDS

LABORATORY

FIELD

No information available

POST-CONSTRUCTION SURVEYS OF DAM

None

BORROW SOURCES

There is no record of where borrow material came from.

ITEM	REMARKS
MONITORING SYSTEMS	According to the Owner's representative an informal warning (by phone) system is in effect during periods of heavy rainfall.
MODIFICATIONS	There is no record of any modifications after the bridge and embankment reconstruction.
HIGH POOL RECORDS	None available
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	None available

ITEM	REMARKS
SPILLWAY PLAN	Refer to Plate 1, Appendix D
SECTIONS	
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	There are no available plans and details for the stop logs which are inserted and/or removed from the slots in the piers of the spillway to regulate the stage in the impoundment.
MISCELLANEOUS	Miscellaneous correspondence, inspection reports, etc. are all available in DEP files

APPENDIX

B

Check List

Visual Inspection

Phase I

Sheet 1 of 7

National

Type of Dam Earth Hazard Category Significant

Date(s) Inspection 4/12/79 Weather Clear Temperature 60°F

Pool Elevation at Time of Inspection $78.9 \pm$ M.S.L. Tailwater at Time of Inspection $72 \pm$ M.S.L.

Inspection Personnel:

Mr. Lee DeHeer

Mr. David B. Campbell

Remarks:

Mr. Steve Albano, president of Friendship Lakes, Inc. was present at the time of the inspection.

EMBANKMENT

Sheet 2 of 7

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
SURFACE CRACKS	None observed	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Several erosion channels were observed on the downstream slope	The downstream embankment slope should be repaired & vegetated
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	The top of the dam varies by a maximum of 3.7 feet	The low portions of the dam should be built up.
RIPRAP FAILURES		

N/A

EMBANKMENT

Sheet 3 of 7

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Some slight undermining was observed at the junction of embankment and upstream and downstream retaining walls.	These areas should be backfilled and compacted with suitable material
ANY NOTICEABLE SEEPAGE	None Observed	
STAFF GAGE AND RECORDER	None Observed	
DRAINS	None Observed	

URGATED SPILLWAY

Sheet 4 of 7

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
CONCRETE WEIR	N/A	Concrete piers with stop logs spanning horizontally between vertical grooves in adjacent piers. They appeared to be in good condition.
APPROACH CHANNEL	N/A	There is no approach channel to the stop log weir.
DISCHARGE CHANNEL	N/A	Country Lakes #2 is about 50 feet downstream of country Lakes #1
BRIDGE AND PIERS	N/A	

INSTRUMENTATION

Sheet 5 of 7

<u>VISUAL EXAMINATION</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
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MONUMENTATION/SURVEYS

None

OBSERVATION WELLS

None

WEIRS

None

PIEZOMETERS

None

OTHER

None

RESERVOIR

Sheet 6 of 7

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

SLOPES

Slopes are relatively flat around the entire perimeter of the reservoir varying between 2 and 10 percent.

SEDIMENTATION

There does not appear to be any excessive accumulation of sediment in the reservoir. Because of the flat gradient around the entire perimeter of the reservoir there is little sediment accumulation even though there is poor vegetative cover around the entire reservoir.

DOWNSTREAM CHANNEL

Sheet 7 of 7

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	<p>The spillway discharges through its outlet (Bridge) into a lake created by a Dam (Country Lakes #2) located about 800 feet downstream.</p>	SLOPES
SLOPES		<p>There is no downstream channel. The discharge over the spillway of Country Lakes Dam No. 1 flows directly into the Country Lakes Dam No. 2 impoundment. The slopes along the perimeter of Country Lakes #2 impoundment are relatively flat (2 to 10 %) and fairly well vegetated.</p>
APPROXIMATE NO. OF HOMES AND POPULATION		<p>There are about 24 homes downstream of the dam which lie within the area that would be affected by a flood resulting from a dam failure. There would probably be appreciable flood damage to the houses, but little chance for loss of life.</p>

APPENDIX

C

Hydrologic & Hydraulic Data

TABLE OF CONTENTS - APPENDIX C

HYDRAULICS & HYDROLOGY

DEVELOPMENT OF CLARK UNIT HYDROGRAPH PARAMETERS	SHEETS 1-2
HEC-I DAM SAFETY VERSION COMPUTER OUTPUT	SHEETS 3-21



O'BRIEN & GERE

SUBJECT

COUNTRY LAKES #1

SHEET

1

BY

SM

DATE

4/20/79

JOB NO.

1800-005-112

VB 5/5/79

INPUT VALUES FOR CLARK HYDROGRAPH

$$T_c + R = 21 \left(\frac{DA}{S} \right)^{.22} S_t^{.33} \times (1 + 0.3I)^{-0.28}$$

DA = drainage area in square miles

S = average channel slope measured from the 10% and 85% points along the stream length - ft/mile

 S_t = storage (% of lakes and swamps)

I = % impervious surface within the drainage area.

$$I = 0.117 D^{0.792 - 0.039 \log D} \quad (\text{USGS Special Rep. \#38})$$

D = basin population density in persons per square mile

$$R / (T_c + R) = 0.60 \quad (\text{from Phila. C.O.E.})$$

DA = 16.0 Square Miles

L = 56,000 ft

0.1 L = 5600 ft (EL. = 79.00)

0.15 L = 8400 ft (EL. = 140.00)

$$L' = 56000 - (8400 + 5600) = 42000 \text{ ft} \approx 8 \text{ miles}$$

SUBJECT	SHEET	BY	DATE	JOB NO.
Country Lakes #1	2	SM	4/20/79	1800-005-112

~~4/15/79~~ 6/15/79

$$S = \frac{\Delta H}{L} = \frac{140 - 79}{8.0} \approx 7.6 \text{ ft./Mile}$$

$$S_t = 27\%$$

$D = 40$ persons per Square Mile

$$I = 0.117 \times 40^{0.792 - 0.039 \log 40} = 1.73$$

$$T_c + R = 21 \left(\frac{16}{7.6} \right)^{0.22} 27^{0.33} \left(1 + 0.3 \times 1.73 \right)^{-0.28} \approx 66$$

$$R / T_c + R = 0.6$$

$$R = 0.6 (T_c + R) = 0.6 \times 66 = \underline{\underline{39.6}}$$

$$T_c + 39.6 = 66$$

$$T_c = 26.4$$

Say $\underline{\underline{T_c = 26.5}}$

 FLOOD HYDROGRAPH PACKAGE (PLC-1)
 MA SAFETY VERSION JULY 1974
 LAST MODIFICATION: 20 FEB 79

001 DATED 07/10/79
 TIME: 13.01.31.

NATIONAL DAM INSPECTION PROGRAM
 COUNTRY LAKE NR.1
 PAF HYDROGRAPH

JOB SPECIFICATION									
NG	UHM	NMIN	IDAY	IHW	IMIN	METRC	IPLT	IPRT	NSTAN
300	3	0	0	0	0	0	0	3	0
JOPER									
			5	NMT		LROPT	TRACE		
			0	0		0	0		

MULTI-PLAN ANALYSES TO BE PERFORMED
 NPLAN= 1 NPTIO= 0 LPTIO= 1
 WTIOS= .10 .20 .28 .30 .40 .50

SUR-AREA RUNOFF COMPUTATION
 RUNOFF TO COUNTRY LAKE NR.1

SUR-AREA RUNOFF COMPUTATION									
ISTAG	ICOMP	IECON	ITAP	JPLT	JPRT	INAME	ISTAGE	IAUTO	
INFLOW	0	0	0	0	0	1	0	0	

HYDROGRAPH DATA
 IHYJC 1 IUNG TAKEA SNAP TMSDA T-SPC RATIO ISNOW ISAME LOCAL
 0 10.00 0.00 16.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
 PRECIP DATA
 SPEE PMS R6 R12 R24 R48 R72 R96
 0.00 23.50 107.00 117.00 124.00 138.00 0.00 0.00

LOSS DATA
 LHMPT STMR OLTR RTIOL ERAIN STAKS RTIOK STIHL CNSTL ALSMX RTIMP
 0 0.00 0.00 1.00 0.00 0.00 0.00 1.00 1.00 0.05 0.00 0.00
 UNIT HYDROGRAPH DATA
 TC= 26.50 ME= 39.60 NTA= 0

RECESSION DATA
 STRIO= -1.50 ORCSN= -.05 RTIOK= 2.00

UNIT HYDROGRAPH 75 END-OF-PERIOD COORDINATES, LAG= 24.96 HOURS, CP= .45 VOL= 1.00

1.	25.	52.	83.	117.	147.	171.	189.	180.
167.	155.	143.	133.	123.	114.	106.	91.	84.
78.	72.	67.	62.	58.	53.	50.	43.	40.
37.	34.	31.	29.	27.	25.	23.	20.	19.
17.	16.	15.	14.	13.	12.	11.	9.	9.

0	4.			7.			6.			END-OF-PERIOD: FLOW			5.			4.			COMP 0		
	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP 0	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP 0	MO.DA	HR.MN	PERIOD	RAIN		EXCS	LOSS
1.01	3.00	1	.03	0.00	.03		22.	1.19	21.00	151	0.00	0.00	0.00	0.00	1.19	21.00	151	0.00	0.00	0.00	0.00
1.01	5.00	2	.03	0.00	.03		21.	1.20	0.00	152	0.00	0.00	0.00	0.00	1.20	0.00	152	0.00	0.00	0.00	0.00
1.01	7.00	3	.09	0.00	.09		19.	1.20	3.00	153	0.00	0.00	0.00	0.00	1.20	3.00	153	0.00	0.00	0.00	0.00
1.01	12.00	4	.09	0.00	.09		18.	1.20	6.00	154	0.00	0.00	0.00	0.00	1.20	6.00	154	0.00	0.00	0.00	0.00
1.01	15.00	5	.54	0.00	.64		17.	1.20	9.00	155	0.00	0.00	0.00	0.00	1.20	9.00	155	0.00	0.00	0.00	0.00
1.01	18.00	6	1.31	1.06	.24		23.	1.20	12.00	156	0.00	0.00	0.00	0.00	1.20	12.00	156	0.00	0.00	0.00	0.00
1.01	21.00	7	.05	0.00	.05		42.	1.20	15.00	157	0.00	0.00	0.00	0.00	1.20	15.00	157	0.00	0.00	0.00	0.00
1.02	0.00	8	.05	0.00	.05		69.	1.20	18.00	158	0.00	0.00	0.00	0.00	1.20	18.00	158	0.00	0.00	0.00	0.00
1.02	3.00	9	.35	.20	.15		103.	1.20	21.00	159	0.00	0.00	0.00	0.00	1.20	21.00	159	0.00	0.00	0.00	0.00
1.02	6.00	10	.35	.20	.15		143.	1.21	0.00	160	0.00	0.00	0.00	0.00	1.21	0.00	160	0.00	0.00	0.00	0.00
1.02	9.00	11	.96	.81	.15		189.	1.21	3.00	161	0.00	0.00	0.00	0.00	1.21	3.00	161	0.00	0.00	0.00	0.00
1.02	12.00	12	.94	.81	.15		244.	1.21	6.00	162	0.00	0.00	0.00	0.00	1.21	6.00	162	0.00	0.00	0.00	0.00
1.02	15.00	13	0.77	6.62	.15		353.	1.21	9.00	163	0.00	0.00	0.00	0.00	1.21	9.00	163	0.00	0.00	0.00	0.00
1.02	18.00	14	13.75	13.60	.15		631.	1.21	12.00	164	0.00	0.00	0.00	0.00	1.21	12.00	164	0.00	0.00	0.00	0.00
1.02	21.00	15	.52	.37	.15		1115.	1.21	15.00	165	0.00	0.00	0.00	0.00	1.21	15.00	165	0.00	0.00	0.00	0.00
1.03	0.00	16	.52	.37	.15		1736.	1.21	18.00	166	0.00	0.00	0.00	0.00	1.21	18.00	166	0.00	0.00	0.00	0.00
1.03	3.00	17	.00	0.00	0.00		2433.	1.21	21.00	167	0.00	0.00	0.00	0.00	1.21	21.00	167	0.00	0.00	0.00	0.00
1.03	6.00	18	.00	0.00	0.00		3131.	1.22	0.00	168	0.00	0.00	0.00	0.00	1.22	0.00	168	0.00	0.00	0.00	0.00
1.03	9.00	19	.00	0.00	0.00		3724.	1.22	3.00	169	0.00	0.00	0.00	0.00	1.22	3.00	169	0.00	0.00	0.00	0.00
1.03	12.00	20	.00	0.00	0.00		4140.	1.22	6.00	170	0.00	0.00	0.00	0.00	1.22	6.00	170	0.00	0.00	0.00	0.00
1.03	15.00	21	.00	0.00	0.00		4349.	1.22	9.00	171	0.00	0.00	0.00	0.00	1.22	9.00	171	0.00	0.00	0.00	0.00
1.03	18.00	22	.00	0.00	0.00		4316.	1.22	12.00	172	0.00	0.00	0.00	0.00	1.22	12.00	172	0.00	0.00	0.00	0.00
1.03	21.00	23	.00	0.00	0.00		4087.	1.22	15.00	173	0.00	0.00	0.00	0.00	1.22	15.00	173	0.00	0.00	0.00	0.00
1.04	0.00	24	.00	0.00	0.00		3747.	1.22	18.00	174	0.00	0.00	0.00	0.00	1.22	18.00	174	0.00	0.00	0.00	0.00
1.04	3.00	25	.00	0.00	0.00		3522.	1.22	21.00	175	0.00	0.00	0.00	0.00	1.22	21.00	175	0.00	0.00	0.00	0.00
1.04	6.00	26	.00	0.00	0.00		3265.	1.23	0.00	176	0.00	0.00	0.00	0.00	1.23	0.00	176	0.00	0.00	0.00	0.00
1.04	9.00	27	.00	0.00	0.00		3027.	1.23	3.00	177	0.00	0.00	0.00	0.00	1.23	3.00	177	0.00	0.00	0.00	0.00
1.04	12.00	28	.00	0.00	0.00		2406.	1.23	6.00	178	0.00	0.00	0.00	0.00	1.23	6.00	178	0.00	0.00	0.00	0.00
1.04	15.00	29	.00	0.00	0.00		2601.	1.23	9.00	179	0.00	0.00	0.00	0.00	1.23	9.00	179	0.00	0.00	0.00	0.00
1.04	18.00	30	.00	0.00	0.00		4211.	1.23	12.00	180	0.00	0.00	0.00	0.00	1.23	12.00	180	0.00	0.00	0.00	0.00
1.04	21.00	31	.00	0.00	0.00		2235.	1.23	15.00	181	0.00	0.00	0.00	0.00	1.23	15.00	181	0.00	0.00	0.00	0.00
1.05	0.00	32	.00	0.00	0.00		2072.	1.23	18.00	182	0.00	0.00	0.00	0.00	1.23	18.00	182	0.00	0.00	0.00	0.00
1.05	3.00	33	.00	0.00	0.00		1921.	1.23	21.00	183	0.00	0.00	0.00	0.00	1.23	21.00	183	0.00	0.00	0.00	0.00
1.05	6.00	34	.00	0.00	0.00		1741.	1.24	0.00	184	0.00	0.00	0.00	0.00	1.24	0.00	184	0.00	0.00	0.00	0.00
1.05	9.00	35	.00	0.00	0.00		1651.	1.24	3.00	185	0.00	0.00	0.00	0.00	1.24	3.00	185	0.00	0.00	0.00	0.00
1.05	12.00	36	.00	0.00	0.00		1530.	1.24	6.00	186	0.00	0.00	0.00	0.00	1.24	6.00	186	0.00	0.00	0.00	0.00
1.05	15.00	37	.00	0.00	0.00		1418.	1.24	9.00	187	0.00	0.00	0.00	0.00	1.24	9.00	187	0.00	0.00	0.00	0.00
1.05	18.00	38	.00	0.00	0.00		1315.	1.24	12.00	188	0.00	0.00	0.00	0.00	1.24	12.00	188	0.00	0.00	0.00	0.00
1.05	21.00	39	.00	0.00	0.00		1219.	1.24	15.00	189	0.00	0.00	0.00	0.00	1.24	15.00	189	0.00	0.00	0.00	0.00
1.06	0.00	40	.00	0.00	0.00		1130.	1.24	18.00	190	0.00	0.00	0.00	0.00	1.24	18.00	190	0.00	0.00	0.00	0.00
1.06	3.00	41	.00	0.00	0.00		1048.	1.24	21.00	191	0.00	0.00	0.00	0.00	1.24	21.00	191	0.00	0.00	0.00	0.00
1.06	6.00	42	.00	0.00	0.00		971.	1.25	0.00	192	0.00	0.00	0.00	0.00	1.25	0.00	192	0.00	0.00	0.00	0.00
1.06	9.00	43	.00	0.00	0.00		900.	1.25	3.00	193	0.00	0.00	0.00	0.00	1.25	3.00	193	0.00	0.00	0.00	0.00
1.06	12.00	44	.00	0.00	0.00		835.	1.25	6.00	194	0.00	0.00	0.00	0.00	1.25	6.00	194	0.00	0.00	0.00	0.00
1.06	15.00	45	.00	0.00	0.00		774.	1.25	9.00	195	0.00	0.00	0.00	0.00	1.25	9.00	195	0.00	0.00	0.00	0.00
1.06	18.00	46	.00	0.00	0.00		717.	1.25	12.00	196	0.00	0.00	0.00	0.00	1.25	12.00	196	0.00	0.00	0.00	0.00
1.06	21.00	47	.00	0.00	0.00		665.	1.25	15.00	197	0.00	0.00	0.00	0.00	1.25	15.00	197	0.00	0.00	0.00	0.00
1.07	0.00	48	.00	0.00	0.00		616.	1.25	18.00	198	0.00	0.00	0.00	0.00	1.25	18.00	198	0.00	0.00	0.00	0.00
1.07	3.00	49	.00	0.00	0.00		571.	1.25	21.00	199	0.00	0.00	0.00	0.00	1.25	21.00	199	0.00	0.00	0.00	0.00
1.07	6.00	50	.00	0.00	0.00		530.	1.26	0.00	200	0.00	0.00	0.00	0.00	1.26	0.00	200	0.00	0.00	0.00	0.00
1.07	9.00	51	.00	0.00	0.00		491.	1.26	3.00	201	0.00	0.00	0.00	0.00	1.26	3.00	201	0.00	0.00	0.00	0.00
1.07	12.00	52	.00	0.00	0.00		455.	1.26	6.00	202	0.00	0.00	0.00	0.00	1.26	6.00	202	0.00	0.00	0.00	0.00
1.07	15.00	53	.00	0.00	0.00		422.	1.26	9.00	203	0.00	0.00	0.00	0.00	1.26	9.00	203	0.00	0.00	0.00	0.00
1.07	18.00	54	.00	0.00	0.00		391.	1.26	12.00	204	0.00	0.00	0.00	0.00	1.26	12.00	204	0.00	0.00	0.00	0.00

1.15	15.00	117	0.00	0.00	0.00	0.00	0.00	0.00	2.03	9.00	267	0.00	0.00	0.00	0.00
1.15	14.00	118	0.00	0.00	0.00	0.00	0.00	0.00	2.03	12.00	268	0.00	0.00	0.00	0.00
1.15	13.00	119	0.00	0.00	0.00	0.00	0.00	0.00	2.03	15.00	269	0.00	0.00	0.00	0.00
1.15	12.00	120	0.00	0.00	0.00	0.00	0.00	0.00	2.03	18.00	270	0.00	0.00	0.00	0.00
1.15	11.00	121	0.00	0.00	0.00	0.00	0.00	0.00	2.03	21.00	271	0.00	0.00	0.00	0.00
1.15	10.00	122	0.00	0.00	0.00	0.00	0.00	0.00	2.04	0.00	272	0.00	0.00	0.00	0.00
1.15	9.00	123	0.00	0.00	0.00	0.00	0.00	0.00	2.04	3.00	273	0.00	0.00	0.00	0.00
1.15	8.00	124	0.00	0.00	0.00	0.00	0.00	0.00	2.04	6.00	274	0.00	0.00	0.00	0.00
1.15	7.00	125	0.00	0.00	0.00	0.00	0.00	0.00	2.04	9.00	275	0.00	0.00	0.00	0.00
1.15	6.00	126	0.00	0.00	0.00	0.00	0.00	0.00	2.04	12.00	276	0.00	0.00	0.00	0.00
1.15	5.00	127	0.00	0.00	0.00	0.00	0.00	0.00	2.04	15.00	277	0.00	0.00	0.00	0.00
1.15	4.00	128	0.00	0.00	0.00	0.00	0.00	0.00	2.04	18.00	278	0.00	0.00	0.00	0.00
1.15	3.00	129	0.00	0.00	0.00	0.00	0.00	0.00	2.04	21.00	279	0.00	0.00	0.00	0.00
1.15	2.00	130	0.00	0.00	0.00	0.00	0.00	0.00	2.05	0.00	280	0.00	0.00	0.00	0.00
1.15	1.00	131	0.00	0.00	0.00	0.00	0.00	0.00	2.05	3.00	281	0.00	0.00	0.00	0.00
1.15	0.00	132	0.00	0.00	0.00	0.00	0.00	0.00	2.05	6.00	282	0.00	0.00	0.00	0.00
1.15	15.00	133	0.00	0.00	0.00	0.00	0.00	0.00	2.05	9.00	283	0.00	0.00	0.00	0.00
1.15	14.00	134	0.00	0.00	0.00	0.00	0.00	0.00	2.05	12.00	284	0.00	0.00	0.00	0.00
1.15	13.00	135	0.00	0.00	0.00	0.00	0.00	0.00	2.05	15.00	285	0.00	0.00	0.00	0.00
1.15	12.00	136	0.00	0.00	0.00	0.00	0.00	0.00	2.05	18.00	286	0.00	0.00	0.00	0.00
1.15	11.00	137	0.00	0.00	0.00	0.00	0.00	0.00	2.05	21.00	287	0.00	0.00	0.00	0.00
1.15	10.00	138	0.00	0.00	0.00	0.00	0.00	0.00	2.06	0.00	288	0.00	0.00	0.00	0.00
1.15	9.00	139	0.00	0.00	0.00	0.00	0.00	0.00	2.06	3.00	289	0.00	0.00	0.00	0.00
1.15	8.00	140	0.00	0.00	0.00	0.00	0.00	0.00	2.06	6.00	290	0.00	0.00	0.00	0.00
1.15	7.00	141	0.00	0.00	0.00	0.00	0.00	0.00	2.06	9.00	291	0.00	0.00	0.00	0.00
1.15	6.00	142	0.00	0.00	0.00	0.00	0.00	0.00	2.06	12.00	292	0.00	0.00	0.00	0.00
1.15	5.00	143	0.00	0.00	0.00	0.00	0.00	0.00	2.06	15.00	293	0.00	0.00	0.00	0.00
1.15	4.00	144	0.00	0.00	0.00	0.00	0.00	0.00	2.06	18.00	294	0.00	0.00	0.00	0.00
1.15	3.00	145	0.00	0.00	0.00	0.00	0.00	0.00	2.06	21.00	295	0.00	0.00	0.00	0.00
1.15	2.00	146	0.00	0.00	0.00	0.00	0.00	0.00	2.07	0.00	296	0.00	0.00	0.00	0.00
1.15	1.00	147	0.00	0.00	0.00	0.00	0.00	0.00	2.07	3.00	297	0.00	0.00	0.00	0.00
1.15	0.00	148	0.00	0.00	0.00	0.00	0.00	0.00	2.07	6.00	298	0.00	0.00	0.00	0.00
1.15	15.00	149	0.00	0.00	0.00	0.00	0.00	0.00	2.07	9.00	299	0.00	0.00	0.00	0.00
1.15	14.00	150	0.00	0.00	0.00	0.00	0.00	0.00	2.07	12.00	300	0.00	0.00	0.00	0.00

SUM 26.46 24.02 2.44 83248.
(672.1) (610.1) (62.1) (2357.32)

PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
434.	1032.	347.	277.	83240.
123.	29.	10.	8.	2357.
CFS	24.00	24.20	24.20	24.20
CMS	604.63	614.62	614.62	614.62
INCHES	20470.	20638.	20638.	20638.
AC-FT	25250.	25457.	25457.	25457.
THOUS CU Y				

HYDROGRAPH AT STAINFLOW FOR PLAN 1. HTIO 1

PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
434.	103.	35.	28.	8324.
12.	3.	1.	1.	234.
CFS	2.40	2.42	2.42	2.42
CMS	60.46	61.46	61.46	61.46
INCHES	2047.	2064.	2064.	2064.
AC-FT	2525.	2546.	2546.	2546.
THOUS CU Y				

HYDROGRAPH AT STAINFLOW FOR PLAN 1. HTIO 2

SH 6

PEAK
 87%
 2%
 CFS
 C4S
 INCHES
 4.80
 121.93
 40%
 5050.
 AC-FT
 THOUS CU M

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 3

PEAK
 121%
 3%
 CFS
 C4S
 INCHES
 5.72
 170.70
 5732
 7070.
 AC-FT
 THOUS CU M

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 4

PEAK
 130%
 3%
 CFS
 C4S
 INCHES
 7.20
 182.89
 6141
 7575.
 AC-FT
 THOUS CU M

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 5

PEAK
 174%
 4%
 CFS
 C4S
 INCHES
 9.50
 243.85
 8188
 10100.
 AC-FT
 THOUS CU M

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 6

PEAK
 217%
 6%
 CFS
 C4S
 INCHES
 12.00
 306.81
 10735
 12625.
 AC-FT
 THOUS CU M

10-DAY
 206.
 6%
 4.80
 122.92
 412%
 5091.
 90-DAY
 55.
 2%
 4.80
 122.92
 412%
 5091.
 TOTAL VOLUME
 166%
 471.
 4.84
 122.92
 412%
 5091.

10-DAY
 249.
 4%
 5.72
 172.09
 577%
 7128.
 90-DAY
 78.
 2%
 6.78
 172.09
 577%
 7128.
 TOTAL VOLUME
 21307.
 600.
 6.78
 172.09
 577%
 7128.

10-DAY
 310.
 10%
 7.20
 184.39
 6191.
 7637.
 90-DAY
 83.
 2%
 7.26
 184.39
 6191.
 7637.
 TOTAL VOLUME
 24972.
 707.
 7.26
 184.39
 6191.
 7637.

10-DAY
 413.
 13%
 9.50
 245.85
 8255.
 10183.
 90-DAY
 111.
 3%
 9.68
 245.85
 8255.
 10183.
 TOTAL VOLUME
 33296.
 943.
 9.68
 245.85
 8255.
 10183.

10-DAY
 516.
 15%
 12.00
 307.31
 10319.
 12728.
 90-DAY
 139.
 4%
 12.10
 307.31
 10319.
 12728.
 TOTAL VOLUME
 41620.
 1179.
 12.10
 307.31
 10319.
 12728.

ROUTING THROUGH COUNTY LAKF NR.1

ISTAD OUTFLU	IC34P	IECON	ITAP:	JPLT	JPRT	INAME	ISTAGE	IAUTO
	1	0	6	0	0	1	0	0
			ROUTING DATA					
GLCSS	AVG	IRCS	ISAP:	IOPT	IPMP		LSTR	
0.0	0.00	1	1	0	0		0	
	STDL	LAG	PMSC:	X	TSK	STORA	ISPRAT	
NSTPS	0	0	0.000	0.000	0.000	-79.	0	

$$A \in \mathcal{A} \Rightarrow A \in \mathcal{A}^*$$

CAPACITY=	6.	78.	4153.
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DATA			
TOPEL	COORD	EXPD	DAMWID
H2.3	3.1	1.5	250.

STATION OUTFLU. PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW:

[illegible]

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AC-FY
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STATION OUTFLOW. PLAN 1. RATIO 3

ENI-UF-POLYMER COORDINATES

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[illegible]

PEAK OUTFLOW IS 155. AT TIME 65.00 HOURS

	PERK	10-DAY	30-DAY	90-DAY	TOTAL	VOLUME
CPS	2155.	516.	174.	139.	41871.	1160.
CMS	61.	15.	7.	4.	1511.	307.69
INCHES		12.00	12.11	12.11		10332.
MM		304.73	307.48	307.69		12744.
AC-FT		10232.	10332.	10332.		12744.
THOUS CU M		12622.	12744.	12744.		

.....

67 48

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS					
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6
				.10	.20	.25	.30	.40	.50
HYDROGRAPH AT	INFLUX	16.00 (41.44)	1	435.	870.	1218.	1305.	1740.	2175.
				(12.32)	(24.63)	(36.95)	(49.26)	(61.58)	(61.58)
ROUTED TO	OUTFLOW	16.00 (41.44)	1	414.	824.	1148.	1242.	1715.	2155.
				(11.72)	(23.34)	(35.11)	(46.82)	(58.53)	(61.03)

..... 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040

**ELEVATION
STORAGE
OUTFLOW**

INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
78.40	78.67	72.30
67.	78.	54.8.
6.	0.	1176.

RATIO OF PMF	MAXIMUM - RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	40.44	0.00	47.	414.	0.00	59.00	0.00
.20	41.51	0.00	403.	824.	0.00	69.00	0.00
.25	42.24	0.00	536.	1168.	0.00	69.00	0.00
.30	42.34	.09	567.	1242.	9.00	69.00	0.00
.40	42.41	.40	1715.	661.	27.00	66.00	0.00
.50	43.11	.61	734.	2155.	39.00	66.00	0.00

APPENDIX

D

Photographs



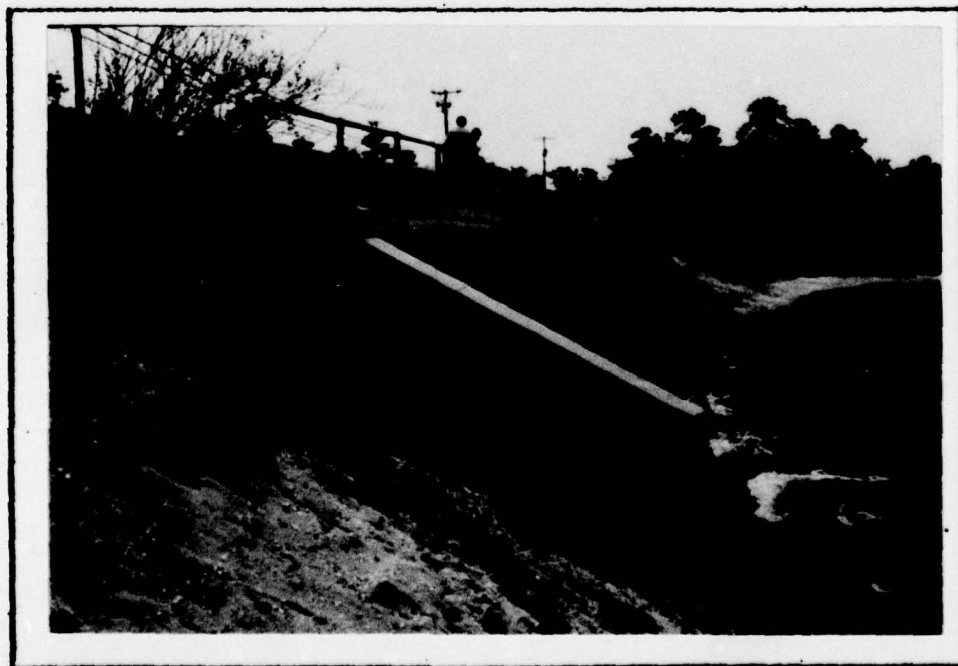
*UPSTREAM FACE OF THE DAM
FROM THE LEFT ABUTMENT 4/12/79*



*SPILLWAY STOPLOG PIERS
AND THE BRIDGE OPENING 4/12/79*



*VIEW OF THE BRIDGE OPENING
AND THE SPILLWAY STOPLOG PIERS 4/12/79*



*DOWNSTREAM FACE OF THE
EMBANKMENT AND BRIDGE 4/12/79*



DOWNSTREAM FACE OF
THE EMBANKMENT
SHOWING DEBRIS
AND TREES
4/12/79



DOWNSTREAM FACE OF THE EMBANKMENT
SHOWING EXTENSIVE DEBRIS 4/12/79

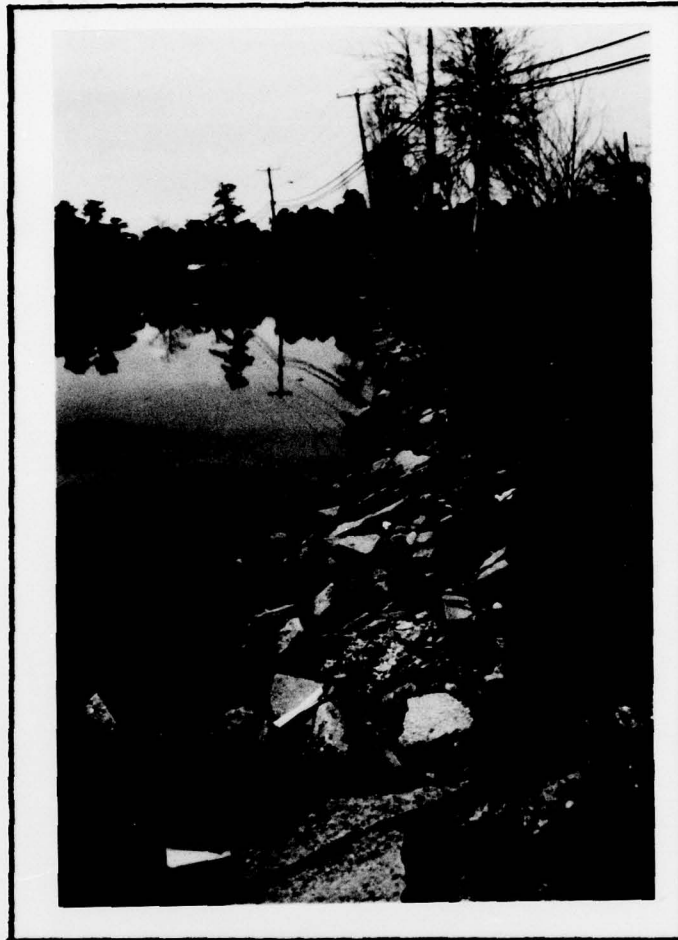


*DOWNSTREAM FACE OF
THE EMBANKMENT
SHOWING EROSION
AND LACK OF COVER
4/12/79*



4/12/79

*DOWNSTREAM FACE OF THE EMBANKMENT SHOWING
EROSION AND MATERIALS INCLUDED IN THE EMBANKMENT* **D-4**



**UPSTREAM FACE OF
THE DAM FROM THE
RIGHT ABUTMENT**

4/12/79



**UNDERMINING OF THE BLOCK WALL ALONG
THE UPSTREAM EMBANKMENT SLOPE**

4/12/79

D-5

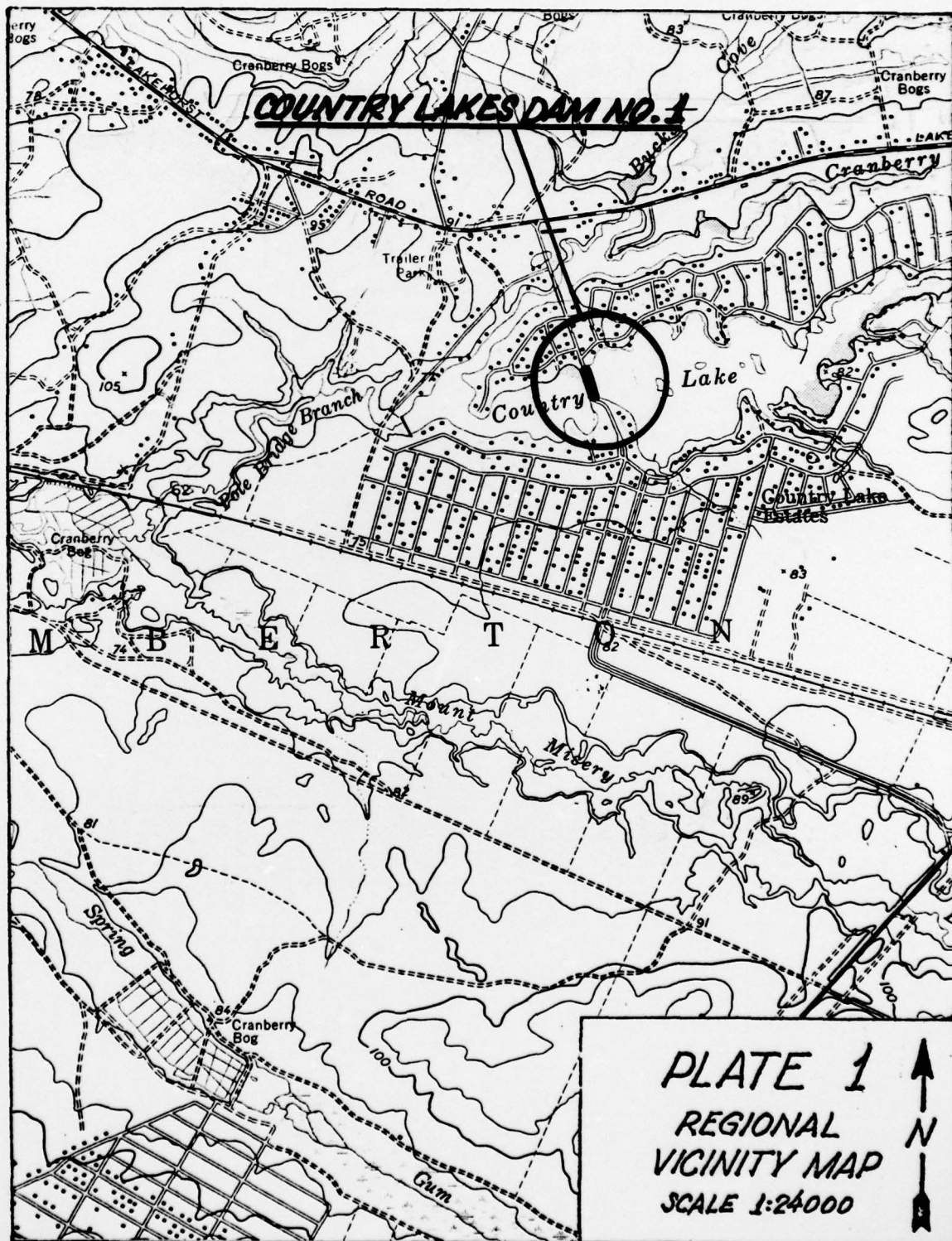
APPENDIX

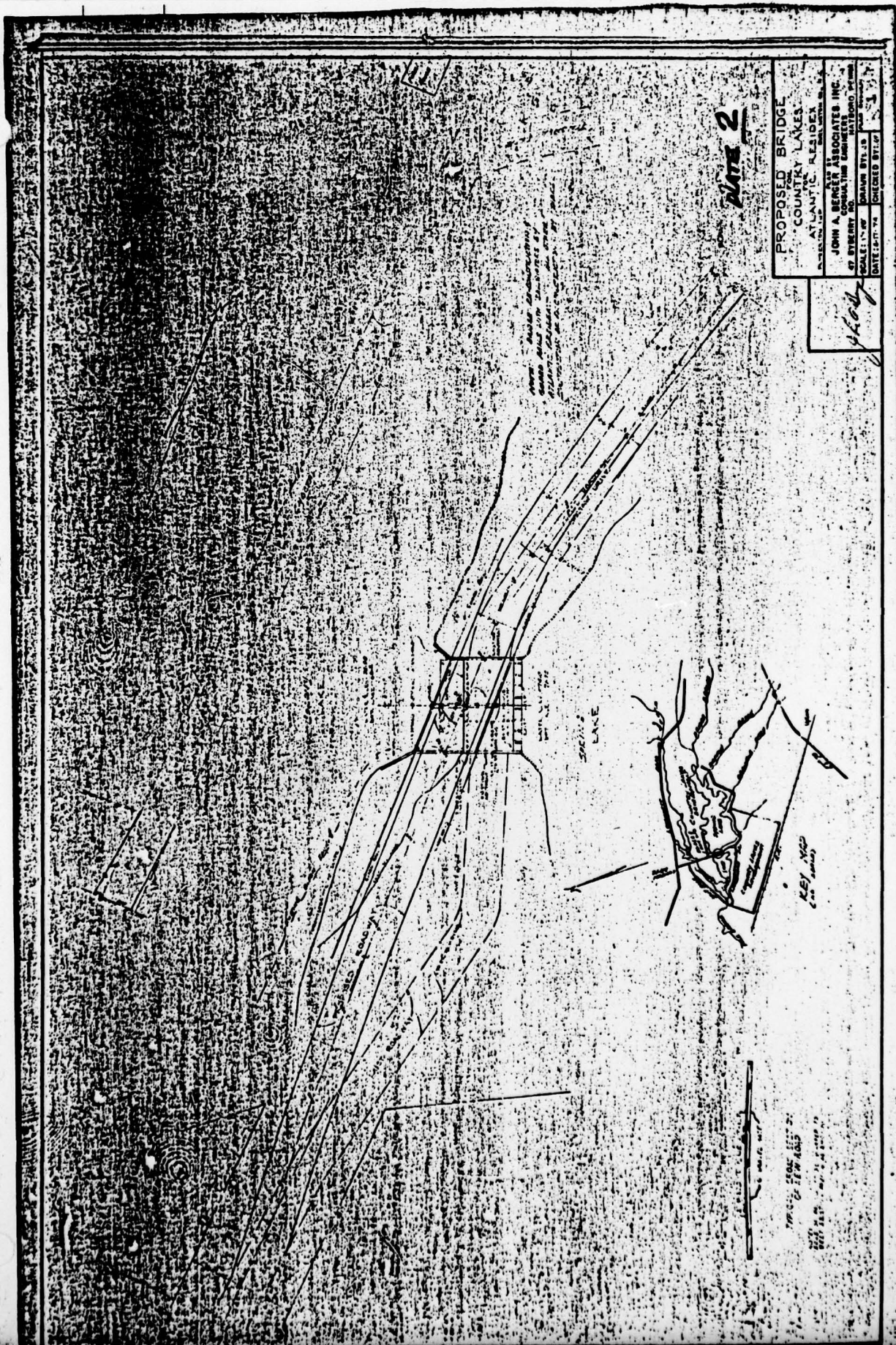
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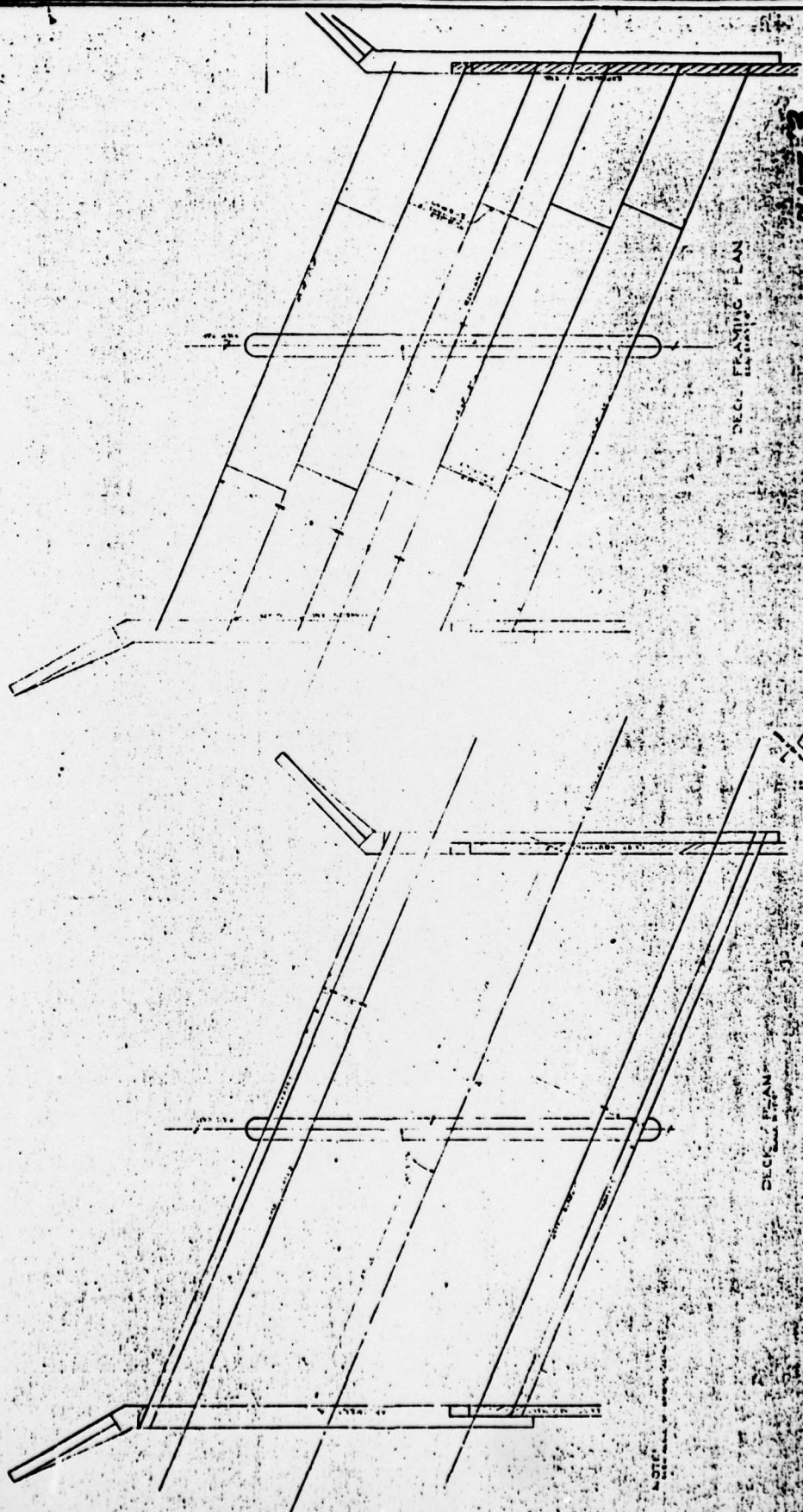
Drawings

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REGIONAL VICINITY MAP	PLATE 1
PROPOSED BRIDGE, 1974 LOCATION PLAN	PLATE 2
STRUCTURAL PLAN OF PROPOSED BRIDGE, 1974	PLATES 3-4
PROFILE ALONG TOP OF DAM	PLATE 5





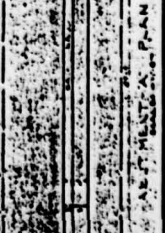
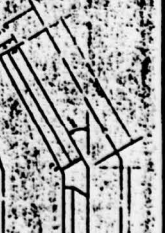
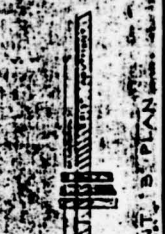


DECK ELEVATION

DECK PLAN

PLAN 3

JOHN A. BENDER ASSOCIATES INC.	
1000 N. 10TH AVE.	MINNEAPOLIS, MN 55403
PHONE 861-1111	FAX 861-1112
DATE: 10/1/88	BY: JAB
PROJECT: 1000 N. 10TH AVE.	
SHEET: 1000 N. 10TH AVE.	



SUBJECT

Country Lakes Dam #1

SHEET

5

BY

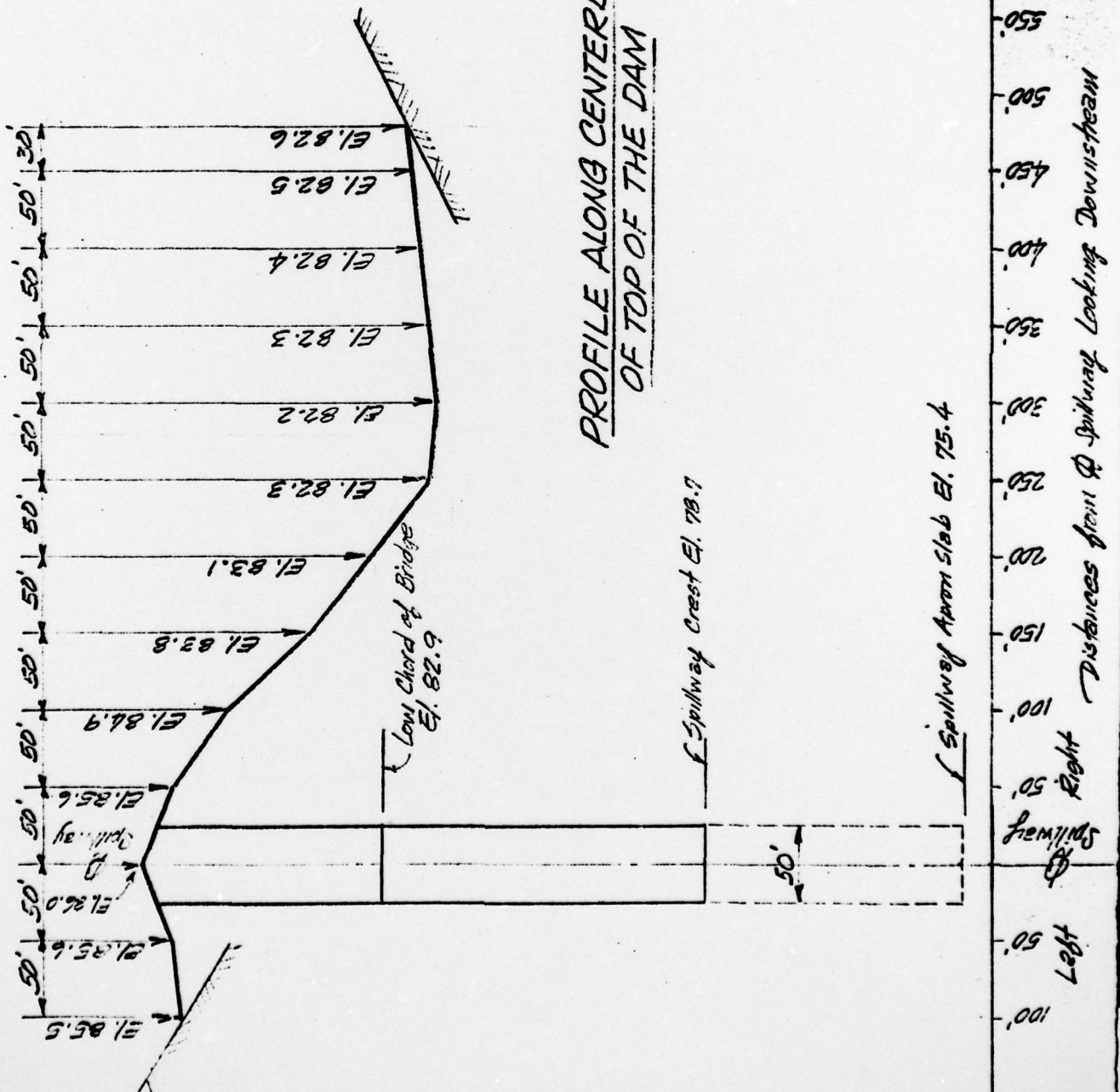
JH

DATE

7/23/79

JOB NO

1800-005-12



Elevation (ft. above MSL)

Distances from Spillway Looking Downstream

Right
Spillway
Left

APPENDIX

F

Site Geology

SITE GEOLOGY

COUNTRY LAKES DAM 1 & 3

Country Lake is located in the Coastal Plain physiographic province which is composed of unconsolidated sedimentary deposits. These beds form a wedge-shaped mass that is exposed at the Fall Line and thickens in a southeasterly direction towards the Atlantic Ocean. The surficial deposits at the dam site consist of a series of tertiary sands comprising the Cahansey formation. No faults or structural defects are noted in the vicinity of the dam or reservoir.

